

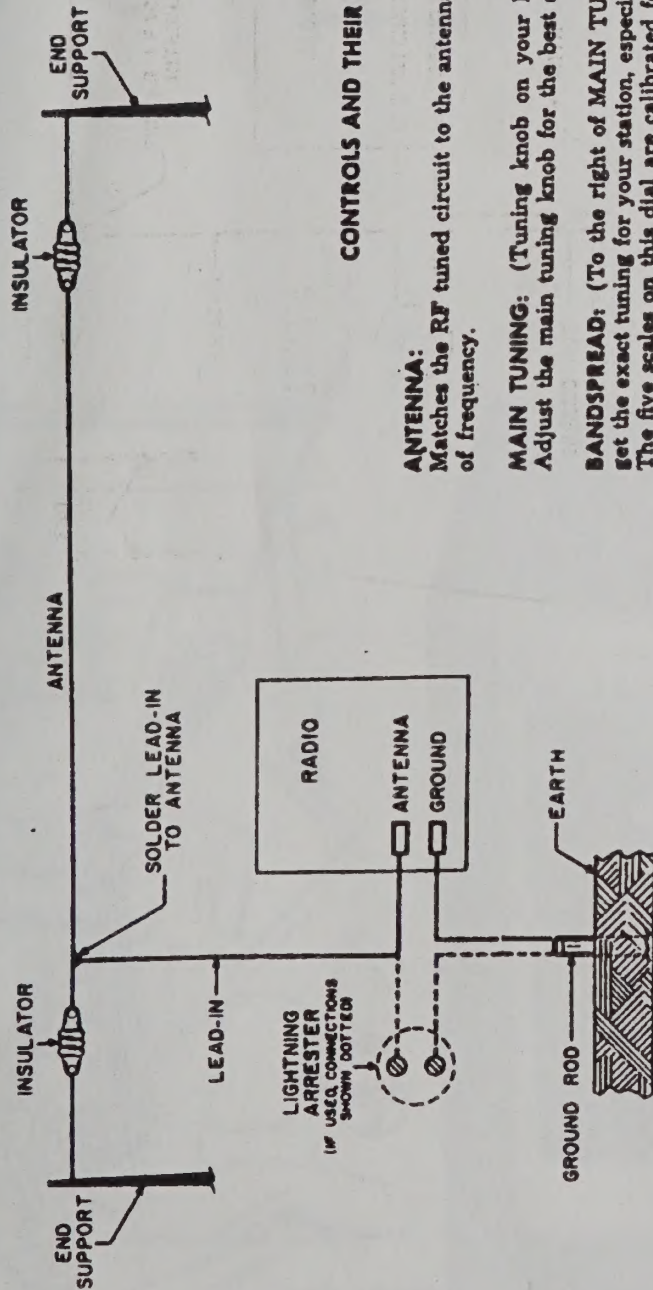


FIGURE 25. INSTALLING AN ANTENNA

OPERATING INSTRUCTIONS

You will gain the greatest pleasure from your receiver if you understand the full possibilities of this fine instrument. Those familiar with communications equipment will quickly recognize the added range and selectivity provided by this highly sensitive receiver. However, even the experienced operator will profit from a careful reading of the section on the use of the Q-Multiplier, since considerable skill and experience are required to fully realize the extra refinements afforded by these circuits.

For the new short wave listener, we suggest that these instructions be followed closely. The extra care used in tuning will be well rewarded by bringing in many distant (DX) stations. The section on the best time for shortwave listening will also be very helpful.

CONTROLS AND THEIR FUNCTIONS

ANTENNA:

Matches the RF tuned circuit to the antenna, when there is a major change of frequency.

MAIN TUNING: (Tuning knob on your left, as you face the receiver). Adjust the main tuning knob for the best dial setting for your station.

BANDSPREAD: (To the right of MAIN TUNING) For fine tuning. Use to get the exact tuning for your station, especially for weak or distant stations. The five scales on this dial are calibrated for Amateur bands 80-10 meters.

CAUTION: MUST BE TURNED FULLY CLOCKWISE WHEN USING THE MAIN TUNING DIAL. OTHERWISE MAIN DIAL CALIBRATIONS WILL BE INACCURATE.

OFF-STBY-RCV-CAL: Turns the receiver on and off. Always in the RCV (Receive) position for listening. Should always be turned to OFF when you are through using the receiver. STBY (Standby) position silences the receiver, but keeps the tubes warm, ready for instant use. CAL (Calibration) position is used only with an accessory crystal calibrator, to check dial calibrations.

QX SELECTIVITY: Sharpens the selectivity of the receiver. Use only as described in Q-Multiplier operating instructions.

PEAK-OFF-NUL: Switches the Q-Multiplier circuits to PEAK (accentuate) or NULL (cancel out). In OFF position QX SELECTIVITY and QX TUNE are switched out of the circuit.

BFO-MVC-AVC-ANL: Selects the mode of operation of the receiver. BFO position is for CW (code and single sideband reception) only. MVC, AVC and ANL are for voice or music listening. AVC (automatic volume control) is the normal position.

MVC (manual volume control) switches out the AVC circuit. Experienced operators will use this position when necessary. **ANL** (automatic noise limiter) is used only for unusually noisy conditions.



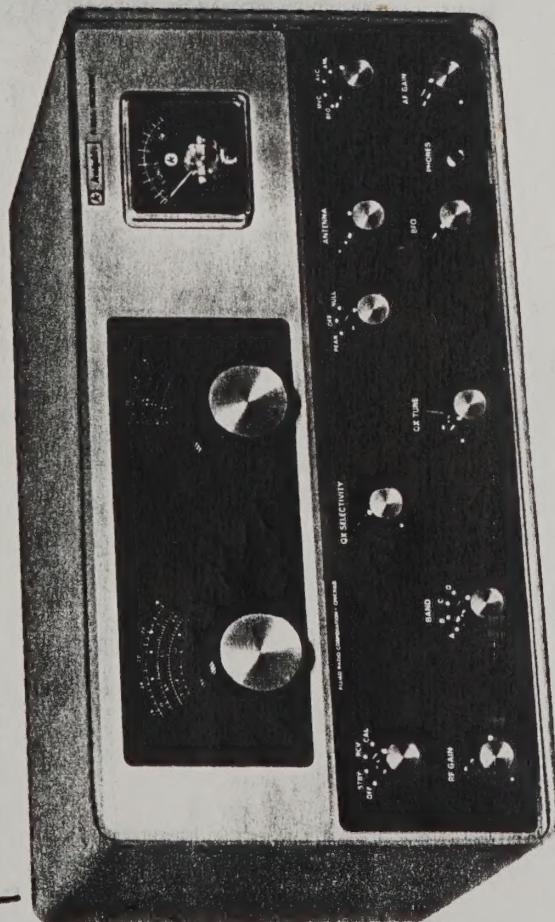
knight-kit

R-100A

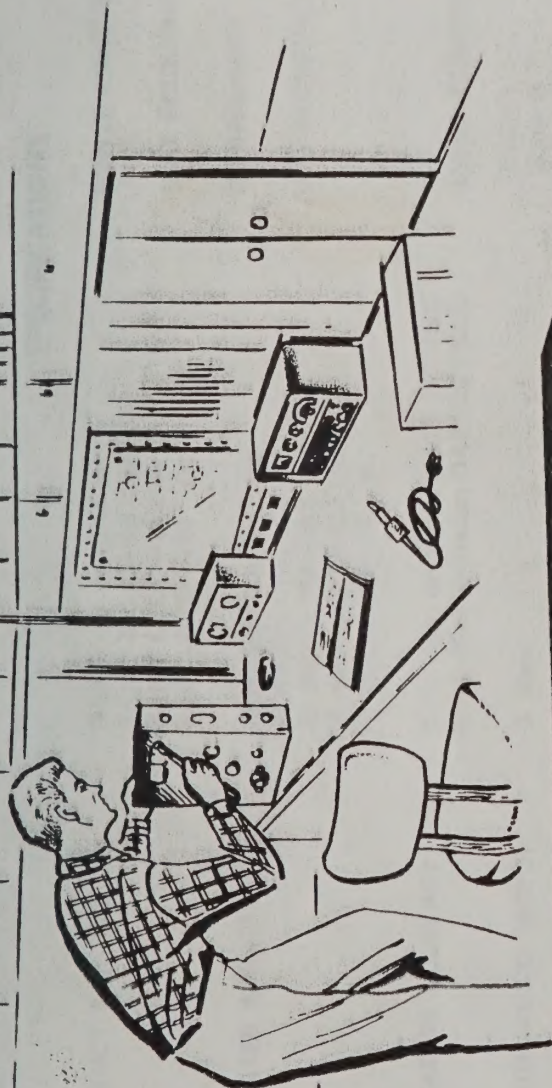
AMATEUR COMMUNICATIONS RECEIVER

An outstanding achievement in communications engineering — this superb receiver uses printed circuitry throughout — to assure uniform characteristics, reliable operation and easy assembly. Features include: 540 kc to 30 mc coverage in 4 ranges; calibrated electrical bandspread on all ham bands from 80-10; slug-tuned Hi-Q coils; built-in Q multiplier peaks signal or supplies 60 db notch to take out interference; delayed AVC and noise limiter.

Sensitivity is better than $1\frac{1}{2}$ μ v sensitivity for a 10:1 signal-to-noise ratio, even on 10 meters. On 40 and 80 meters, sensitivity is $\frac{1}{2}$ to $\frac{3}{4}$ μ v (broadcast band sensitivity 4 μ v). Selectivity is continuously variable from 300 cps to $4\frac{1}{2}$ kc at 6 db down. You'll be proud to own and operate this top-notch receiver.



- Better than $1\frac{1}{2}$ μ v Sensitivity
- Bandspread on 80-10 Meter Bands
- Selectivity, 300 cps to $4\frac{1}{2}$ kc
- Built-in Q Multiplier
- 540 kc to 30 mc General Coverage
- Printed Circuit Bandswitch



SPECIFICATIONS

FREQUENCY RANGE	BAND A 54—1.65 mc BAND B 1.6—4.6 mc BAND C 4.4—12.4 mc BAND D 12—30 mc	POWER CONSUMPTION	45 Watts at 117 V AC, 60 cps
CALIBRATED BANDSPREAD	80 meters 3.5—4 mc 40 meters 6.9—7.3 mc 20 meters 14.0—14.4 mc 15 meters 20.5—21.5 mc 10 meters 26.6—30 mc	BEAT FREQUENCY	Varies from zero beat to 5 kc
CALIBRATION ACCURACY	0.7% Max. deviation MAIN TUNING 0.15% Max. deviation BANDSPREAD	IF FREQUENCY	455 kc
MAXIMUM AUDIO OUTPUT	.5 Watt	HFO FREQUENCY	455 kc higher than incoming signal on Band A, B and C. Lower than incoming signal by 455 kc on Band D
AUDIO OUTPUT IMPEDANCE	8Ω	IMAGE REJECTION RATIO	Low end High end Band A 80 db 40 db Band B 68 db 40 db Band C 30 db 25 db Band D 40 db 20 db
AVC	Delayed action over —2.0 V bias	DIMENSIONS	Width, 17 $\frac{1}{8}$ ". Depth, 9 $\frac{5}{8}$ ". Height with legs, 9 $\frac{1}{8}$ ".
VARIABLE SELECTIVITY	300 cps — 4.5 kc (6 db down) Up to 60 db null and 70 db peak	NET WEIGHT	25 lbs.
SENSITIVITY	1.5 μ V or better at 10:1 signal to noise ratio on Band B, C and D 4 μ V or better on Band A	TUBE COMPLEMENT	6BZ6 (RF Amp); 6BH8 (Mixer and HFO); 6AZ8 (1st IF Amp); 6AZ8 (2nd IF Amp); 6BC7 (Detector-AVC-ANL); 6AW8A (BFO and Power Amp); ECC83/12AX7 (Q Multiplier); 6X4 (Full wave rectifier); OB2 (Voltage regulator).
ANTENNA INPUT IMPEDANCES	Low impedance coaxial or twin-line		

See page 45 for equipment used for specifications measurements.

FEATURES

PRINTED CIRCUITS USED IN RF, IF AND AUDIO STAGES	DELAYED AVC ACTION
PRINTED CIRCUIT BANDSWITCH	AUTOMATIC NOISE LIMITER
MULTI-PURPOSE TUBES PROVIDE ELEVEN-TUBE PERFORMANCE	PROVISION FOR REMOTE-CONTROLLED STANDBY-RECEIVE
CONSTANT RUNNING HFO, WITH VOLTAGE-REGULATED B+ SUPPLY	PROVISION FOR ADDITION OF S-METER AND CRYSTAL CALIBRATOR
BUILT-IN Q-MULTIPLIER PEAKS DESIRED SIGNAL OR NULLS INTERFERENCE	TWO ANTENNA INPUTS—FOR COAX OR TWIN LINE
VARIABLE SELECTIVITY THROUGHOUT IF PASSBAND	DELUXE, MODERN DESIGN—WELL VENTILATED CABINET—RUGGED CHASSIS

PRELIMINARY TESTS

If a voltmeter (VTVM or a 20,000 ohms/volt VOM) is available, use the + DC volt scales, set the receiver controls as follows, and make the following measurements: Refer to Figure 21. If any of the measurements do not correspond (within $\pm 20\%$), recheck the wiring and soldering, and be sure the components are not shorting together or to the chassis.

OFF-STBY-RCV-CAL	RCV position
RF GAIN	Full clockwise
A-B-BAND-C-D	Position A
PEAK-OFF-NULL	OFF position
AF GAIN	Full counterclockwise
BFO-MVC-AVC-ANL	MVC position

Stand the receiver on its back.

- ☐ Between ground and hole 18 of the IF printed circuit board, the meter should read 183 v.
- ☐ Between ground and hole 26 of the IF printed circuit board, 180 v.
- ☐ Between ground and hole 13 on the RF printed circuit board, 180 v.
- ☐ Between ground and hole 37 of the IF printed circuit board, 2.5 v.
- ☐ Between ground and hole A on the RF printed circuit board, 1.0 v. Now, turning the RF GAIN control slowly counterclockwise, the meter should read from 1.0 v through 15 v.

- ☐ Connect an antenna to the terminal marked "A". If you use a coaxial antenna lead in, connect it to J-1. Connect a ground wire to the terminal marked "G".

Set the controls as follows:

RF GAIN	Full clockwise
BFO-MVC-AVC-ANL	AVC position
BANDSPREAD TUNING	Full clockwise
(Check that the hairline on the high-frequency end of the BAND-SPREAD dial coincides with the hairline on the crystal.)	
AF GAIN	Half clockwise

- ☐ Use the MAIN TUNING control to tune in a standard broadcast station. You should be able to hear strong local stations. Now tune through the range with the bandswitch in the B, then the C and D positions. If noise and some type of signal are heard on each band the receiver is ready for alignment. However, if any band sounds "dead" DO NOT ATTEMPT TO ALIGN THE RECEIVER. Read the service hints and correct any fault before proceeding with the alignment.

ALIGNMENT PROCEDURE

Two methods of receiver alignment are outlined in this section: Alignment using signal generator and meter; and alignment "on the air". The most accurate alignment can be achieved by using a signal generator and meter. If it is not possible to obtain the use of these instruments, the receiver can be aligned by the methods outlined in the section "Alignment On The Air." To obtain the full sensitivity of the receiver, accurate alignment is necessary.

CAUTION: DO NOT ATTEMPT TO ADJUST COILS L-1 THROUGH L-12 IF ANY BAND OF THE RECEIVER SOUNDS "DEAD". THE COILS ARE PRE-ALIGNED AND ONLY SLIGHT ADJUSTMENT IS NEEDED FOR ALIGNMENT.

ALIGNMENT USING SIGNAL GENERATOR AND METER

The meter used can be the built-in S-Meter, if you have one, or any VTVM or a volt-ohmmeter with at least 5000 Ω per volt AC sensitivity.

If you are using the S-Meter, connect your speaker or plug in your headphones. If you use a VTVM or VOM, remove the headphone plug because it opens the circuit to the speaker terminals. Connect the VTVM or VOM across the speaker terminals. (Ground lead goes to terminal G.)

Turn the receiver to RCV and listen for random noise to be sure that the receiver is ready for alignment. Disconnect the antenna.

IF ALIGNMENT

- ☐ Short out the oscillator section of the MAIN TUNING capacitor by connecting a wire between chassis and terminal 3 of the MAIN TUNING capacitor. See Figure 20.

Set controls as follows:

BFO-MVC-AVC-ANL	AVC (if you use the S-Meter)
AF GAIN	MVC (if you use an external meter)
RF GAIN	Fully clockwise (Reset later when necessary)
PEAK-OFF-NULL	Fully clockwise
A-B-BAND-C-D	OFF
MAIN TUNING capacitor	A
BANDSPREAD capacitor	Plates fully meshed
	Plates fully meshed

- ☐ Raise the tube shield of V-2, the 6BH8 oscillator tube, about 1" above the tube. Be careful not to short the tube shield against the chassis. Set the signal generator at 455 kc modulated output, using the maximum output available. Connect the generator output cable to the tube shield of V-2.

THROUGHOUT THE ALIGNMENT PROCEDURE, AS THE OUTPUT INCREASES, REDUCE GENERATOR OUTPUT TO THE LOWEST NEEDED FOR AUDIBILITY, TO AVOID OVERLOADING YOUR RECEIVER.

NOTE: The IF transformer slugs fit lightly. When you use the alignment tool, be careful not to chip out the slots into which the tool fits.

- ☐ Use the IF alignment tool with screwdriver tip supplied with your kit. Adjust the IF transformers for maximum meter reading. Start with Z-3 (top and bottom); then adjust Z-2 (top and bottom) and Z-1 (top and bottom). Repeat in the same order until no further gain is obtained. When the IF stages are close to alignment, an appreciable amount of noise will be heard because of the high sensitivity of the receiver.
- ☐ Reseat the oscillator tube shield. Remove the grounding wire, which was temporarily connected to terminal 3 of C-1.

NOTE: During alignment, use the photo on page 40 for trimmer identification.

HIGH FREQUENCY OSCILLATOR, RF AND MIXER ALIGNMENT

- ☐ Turn the bandspread capacitor fully clockwise (plates fully open). This is essential for correct calibration.

The other receiver controls remain in the same position as for IF alignment, except for the A-B-BAND-C-D switch which will be used in each of the four positions.

- ☐ Connect the output lead of the signal generator to a 300-500 μmfd capacitor. Connect the other end of the capacitor to the antenna input of the receiver.

Note: Because adjustments at the high and low ends of the band affect each other, repeat each alignment step until no further gain is obtained. Follow the exact order given in the alignment chart. Adjust only the trimmer at the high end; adjust only the coil at the low end. All adjustments are made for maximum meter reading and loudest receiver output.

SEE THE ALIGNMENT CHART ON THE NEXT PAGE.

Step 1. Band A Oscillator Alignment

- ☐ Set the receiver bandswitch at A. Set the tuning dial of the receiver and signal generator EXACTLY at 1.65 mc. Use the screwdriver-tip alignment tool to adjust C-16A for maximum meter reading and loudest output.

- ☐ Set receiver and generator dials EXACTLY at .55 mc. Use the hex-tip alignment tool to adjust L-1 for maximum. Only a slight adjustment is needed because the coils are pre-aligned.

- ☐ Repeat step 1, following the exact order given in the chart.

Step 2. Band A RF and Mixer Alignment

- ☐ Set the receiver dial exactly at 1.4 mc, the generator at approximately 1.4 mc. Slowly "rock" the generator dial (a little to the right, then a

little to the left) to find the generator setting that produces maximum receiver output. Adjust C-12A, then C-3, the ANTENNA control.

- ☐ Set receiver exactly at .6 mc, generator approximately at .6 mc. "Rock" the generator dial to find the setting that produces maximum receiver output. Adjust L-9 then L-5 for maximum. Very slight adjustment is needed.

- ☐ Repeat step 2, following the exact order listed in the chart.

Step 3. Band B Oscillator Alignment

- ☐ Set bandswitch at B, receiver and generator EXACTLY at 4.6 mc. Adjust C-16B for maximum.

- ☐ Turn generator to 3.69 mc and turn up generator output to check for an image frequency (receiver still at 4.6 mc). If no signal is heard at the receiver, C-16B is correctly adjusted. However, if a signal is heard, C-16B is incorrectly adjusted to the wrong side of the signal frequency. To correct the adjustment, turn the signal generator dial to 4.6 mc. A signal will still be heard. Now turn C-16B counterclockwise. The signal will become fainter, then inaudible. As you continue to turn C-16B counterclockwise the signal will be heard again and will reach a new maximum. At this point the oscillator is correctly adjusted to the high side.

- ☐ Set receiver and generator EXACTLY at 1.6 mc. Adjust L-2 for maximum.
- ☐ Repeat the entire step 3.

Step 4. Band B RF and Mixer Alignment

- ☐ Perform step 4 as shown in the alignment chart. As in step-2, "rock" the generator dial for maximum receiver output before adjusting C-12B and C-3 on the high end of the dial, or L-10 and L-6 at the low end of the dial. Repeat step 4.

Step 5. Band C Oscillator Alignment

- ☐ Set receiver and generator at the exact frequency shown in the chart and make the indicated adjustments. Check for an image by setting the receiver at 12.4 mc, generator at 11.49 mc. If no signal is heard, C-16C is correctly adjusted. If a signal is heard, set the generator dial at 12.4 mc and turn C-16C counterclockwise until a new maximum is reached.

Step 6. Band C RF and Mixer Alignment

- ☐ Perform step 6 as shown in the alignment chart. Remember to "rock" the generator dial as in step 4.

Step 7. Band D Oscillator Alignment

- ☐ Set receiver and generator at the exact frequency shown in the chart and make the indicated adjustments. Check for an image by setting the receiver at 30 mc, signal generator at 30.91 mc. If a signal is heard, correct by setting signal generator at 30 mc and turning C-16D clockwise until a new maximum is reached.

Step 8. Band D RF and Mixer Alignment

- ☐ Perform step 8 as shown in the alignment chart. Remember to "rock" the dial to find the desired generator setting.

HIGH-FREQUENCY OSCILLATOR, RF AND MIXER STAGES ALIGNMENT

STEP	BAND-SWITCH	RECEIVER AND SIGNAL GENERATOR	ADJUST FOR MAXIMUM*
1. (Oscillator)	A	1.65 mc .55 mc	C-16A L-1
REPEAT STEP 1			
2. (Mixer and RF)	A	1.4 mc .6 mc	C-12A then C-3 L-9 then L-5
REPEAT STEP 2			
3. (Oscillator)	B	4.6 mc 1.6 mc	C-16B Check for image L-2
REPEAT STEP 3			
4. (Mixer and RF)	B	3.9 mc 1.75 mc	C-12B then C-3 L-10 then L-6
REPEAT STEP 4			
5. (Oscillator)	C	12.4 mc 4.4 mc	C-16C Check for image L-3
REPEAT STEP 5			
6. (Mixer and RF)	C	10.4 mc 4.7 mc	C-12C then C-3 L-11 then L-7
REPEAT STEP 6			
7. (Oscillator)	D	30.0 mc 12.0 mc	C-16D Check for image L-4
REPEAT STEP 7			
8. (Mixer and RF)	D	27.0 mc 13.0 mc	C-12D then C-3 L-12 then L-8
REPEAT STEP 8			

*If you have disturbed the pre-aligned setting of the slug of any of the coils, L-1 through L-12, proceed as follows:

Turn the slug counterclockwise until it is level with the top of the coil. Now turn the slug clockwise until you reach a maximum (1st maximum). Turning the slug still further clockwise you will reach another maximum (2nd maximum).

Coils L-3, L-6, L-9, L-10, and L-12 should be aligned on their first maximum, while coils L-1, L-2, L-4, L-5, L-7, L-8, and L-11 should be aligned on their second maximum.

It may help to know the original positions of the slugs in the pre-aligned coils. Approximate depths, measured from the top of the slugs to the top of the coil forms are: 3/16" (L-1, L-6); 7/16" (L-3, L-7); 1/4" (L-2); 5/8" (L-4, L-8); 5/16" (L-5, L-9, L-10, L-12); 3/4" (L-11).

DO NOT INTERCHANGE THE SLUGS OF ANY COIL.

BFO ALIGNMENT

Use the same setup as for RF and Mixer alignment, except control settings that are changed in the following steps.

- ☐ Turn the A-B-BAND-C-D switch to "C" position. Set the receiver dial near 6 mc, selecting a point at which no station is heard. Set the generator for 6 mc modulated output and tune the generator for a maximum meter reading at the receiver.
- ☐ Turn the modulation off at the generator. Turn the BFO-MVC-AVC-ANL switch to BFO position.
- ☐ Set the BFO control in a midway position (white dot pointing straight up).
- ☐ Adjust the BFO coil, L-15, for zero beat using the IF alignment tool supplied.

You will be approaching zero beat when you hear a change in tone, going from a high to low pitch. Continue adjusting the coil, until you reach a zero point of no sound.

- ☐ Now turn the BFO control to either side of the center setting. The tone should vary in pitch, from low to high, on either side of center setting. BFO alignment is now complete.

Q-MULTIPLIER ALIGNMENT

- ☐ Same as for BFO alignment, except control settings:
AVC (if you use S-meter)
MVC (if you use an external meter)

A position
Midway position
Midway (red pointer straight up)

- ☐ Set the MAIN TUNING dial near 1000 kc, selecting a point at which no station is heard. Set the generator for 1000 kc modulated output and tune the generator for a maximum meter reading at the receiver.

- ☐ Turn the PEAK-OFF-NUL switch to PEAK position. Now adjust L-14, the Q-Multiplier coil for maximum meter reading at the receiver. The PEAK circuit of the Q-Multiplier is now aligned.

- ☐ Switch the modulation off at the signal generator.

- ☐ Adjust R-25, the QX Null control, to half-way position.

- ☐ Turn the PEAK-OFF-NUL switch to NULL position. Note: The meter reading at the receiver will decrease.

- ☐ Slightly "rock" the QX TUNE control, to the right and then to the left of center setting, until you get the greatest meter "dip" at the receiver. Increase signal generator output during this procedure, to maintain a useable meter reading at the receiver.

- ☐ Turn R-25 very slowly counterclockwise, increasing the dip, until the lowest meter reading is reached.

- ☐ Repeat the last two steps until the greatest possible dip at the receiver meter has been achieved. The NULL circuit is now aligned.

- ☐ Mount 4 rubber feet on the cabinet bottom. Use four 6-32 x 5/16" screws, lockwashers and nuts. Now install the receiver in the cabinet. Use 6-32 x 5/16" screws.

ALIGNMENT ON THE AIR

The following alignment procedure can be used if a signal generator and meter are not available.

IF ALIGNMENT

Set the receiver controls for standard broadcast reception: OFF-STBY-RCV-CAL in RCV; BFO-MVC-AVC-ANL in AVC; AF and RF GAIN, fully clockwise; A-B-BAND-C-D in A; PEAK-OFF-NULL in OFF. Tune in a strong station near 1.6 mc on the MAIN TUNING dial.

Now use the IF alignment tool supplied to adjust the IF transformers for loudest signal. Start with Z-3 (top and bottom). Then adjust Z-2 (top and bottom) and Z-1 (top and bottom). Repeat in the same order until no further increase in signal is heard. During this procedure, reduce the AF GAIN setting whenever necessary.

HIGH-FREQUENCY OSCILLATOR, MIXER AND RF ALIGNMENT

Use the same control positions as for IF alignment, except: *TURN THE BANDSPREAD CAPACITOR FULLY CLOCKWISE. THIS IS ESSENTIAL FOR CORRECT CALIBRATION.*

Refer to the table given under instrument alignment of these stages for each band. The same adjustments can be made by ear, listening for maximum signal. The check for image frequencies can be made as described on page 28, except the image will be found by turning the receiver dial 910 kc from the setting to be checked. On bands B and C the image will come in 910 kc below the fundamental; on band D 910 kc above the fundamental.

NOTE: The order given must be followed exactly, with the capacitor adjustment made at the *beginning* of each step, and the coil adjustment at the end of each step. Usually only slight coil adjustments are needed.

Select stations as close as possible to those frequencies listed in the table. Actual stations will be used, instead of a signal generator, to supply the alignment signals. In each case use a station of known frequency only, preferably a station whose frequency is marked on the dial. Set the dial exactly at the station frequency actually used, not at the frequencies listed in the table.

After the adjustments specified in the table are completed, test your calibration by tuning in WWV on Band C at 5 and 10 mc, and on Band D at 15 and 20 mc.

BFO ALIGNMENT

Start with the same control settings as for RF alignment. Turn your receiver to the strongest signal available from WWV. Reduce the RF gain to a comfortable level. Set the BFO control in a midway position (white dot pointing straight up. Turn BFO-MVC-AVC-ANL to BFO.

Adjust the BFO coil, L-15, for zero beat, using the IF alignment tool supplied. Now turn the BFO control to either side of the center setting. The tone should vary in pitch, from low to high, on either side of center setting.

Q-MULTIPLIER ALIGNMENT

Tune your receiver to the strongest available signal from WWV. Set the QX TUNE control in the halfway position and the QX SELECTIVITY turned about $\frac{2}{3}$ of the way to the right. Switch PEAK-OFF-NULL to PEAK. There will be an apparent loss of gain because of the increased selectivity. Adjust L-14 until there is a noticeable change of pitch, with high notes decreasing, until a low, flat sound is heard. If you go past the required point, the tone will again become higher in pitch. This procedure is somewhat similar to zero-beating.

You are now ready to align the NULL circuit. Set R-25, the QX NULL control at the half-way position. Turn the PEAK-OFF-NULL switch to NULL. There will be a noticeable decrease in signal. "Rock" the QX TUNE control slightly until the signal reaches its faintest point. Now adjust R-25 very slowly, counterclockwise, until the greatest nulling effect has been achieved. Repeat these adjustments until no further nulling effect takes place.

- ☐ Mount 4 rubber feet on the cabinet bottom. Use four 6-32 x 5/16" screws, lockwashers and nuts.
- ☐ Install the receiver in the cabinet. Use six 6-32 x 5/16" screws.

INSTALLING AN ANTENNA

A good antenna will enable you to obtain maximum performance from your receiver. On the rear of the chassis, two antenna inputs are provided, one for coaxial lead-in wire, the other for open-wire lead-in. A half-wave dipole is recommended for top performance on a particular band of frequencies, such as an Amateur band. An Amateur transmitting antenna is ideal for this purpose. A single wire antenna of between 30 to 50 feet provides the best all-around reception for short-wave listening.

If you prefer to use a single-wire antenna, see Figure 25 for suggested installation. For the exact specifications for a half-wave dipole antenna, see the antenna section in the "Amateur Handbook", published by the ARRL.

to the left, sweeping through the group of stations until the desired station is heard clearly.

BFO-MVC-AVC-ANL: Usually in AVC position. May be switched to ANL during unusually noisy conditions, especially at the higher frequencies where automobile ignition and other man-made noises may interfere.

CW (CODE) RECEPTION

BFO-MVC-AVC-ANL

RF GAIN

A-8-BAND-C-D

AF GAIN

BFO

Use as volume control

Set for desired band

Set to maximum clockwise position

AMATEUR FREQUENCIES

BAND SETTING	AMATEUR BAND	FREQUENCY RANGE
B	80 meters	3.5 — 4.0 mc
C	40 meters	7.0 — 7.3 mc
D	20 meters	14.0 — 14.35 mc
D	15 meters	21.0 — 21.45 mc
D	10 meters	28.0 — 29.7 mc

MAIN TUNING: Set the MAIN TUNING dial at the index mark for the desired Amateur band.

BANDSPREAD: Slowly turn the BANDSPREAD dial until the desired station is heard.

BFO: Adjust the BFO control for the most pleasing note.

SINGLE SIDEBAND RECEPTION

OFF-STBY-RCV-CAL: RCV

BFO-MVC-AVC-ANL: MVC

MAIN TUNING: To index mark for desired Amateur band.

BANDSPREAD: Precedence has established the use of SSB transmitters in certain sections of each Amateur band. At the present time, these are:

30 meter band	high frequency end
40 meter band	high & low freq. ends
20 meter band	high frequency end
15 meter band	high frequency end
10 meter band	around 28.65 mc

RF GAIN: AT MINIMUM

AF GAIN: AT MAXIMUM

A standard AM transmitted signal consists of an RF carrier and two sidebands, which results from the modulation of the RF carrier. A SSB signal is characterized by the suppression of the carrier and one of the side bands. Thus the transmitted signal consists of one sideband only. It is fast becoming an increasingly popular method of transmission because it occupies less space in the radio spectrum and because there is considerably less interference encountered among SSB signals during reception.

Reception of SSB signals requires the reinsertion of a carrier before the signal can be demodulated. This is done by the BFO.

Start by tuning to the portion of an Amateur band containing SSB signals. While tuning, turn the RF GAIN control up until loud, but unintelligible sounds are heard. It will sound something like duck quacking. Switch the BFO-MVC-AVC-ANL control to BFO and carefully tune the BFO control until intelligible sound is heard. The BFO control may be left at its setting while the BANDSPREAD dial is tuned to other stations. However, a change in sideband transmission from "lower" to "upper" sideband or vice-versa requires a readjustment of the BFO control.

THE Q-MULTIPLIER

The purpose of the Q-Multiplier and its associated controls (QX SELECTIVITY and QX TUNE) is to improve the selectivity of the receiver. Selectivity is the ability to select only the desired station, separating it from adjacent stations which may be very close in frequency. For domestic and foreign broadcasts, it is recommended that the Q-Multiplier (PEAK-OFF-NULL) be in the OFF position, to maintain full audio quality. However, the Q-Multiplier can be used if you are trying for DX reception and are not concerned with audio quality.

The Q-Multiplier can be used either to peak (accentuate) a narrow band of desired frequencies, or to null (cancel) a narrow band of undesired frequencies. Experience with these controls will soon teach you the best settings for the existing conditions.

PEAKING.

First, tune in the signal to maximum loudness with the Q-Multiplier in OFF position. Then switch to PEAK position. There will be an apparent decrease of audio output, because the increased selectivity will narrow the IF band width. The gain will come up in the following peaking procedure.

Start with the QX SELECTIVITY control in the midway position. Now turn the QX SELECTIVITY control slowly to the right. At the same time "rock" the QX TUNING control back and forth, to either side of the midway position. During this procedure, you will find a point in the swing of the QX TUNING control where the signal is noticeably stronger. This is the desired QX TUNING control position. The QX SELECTIVITY control may be turned further to the right for greater peaking. However, if it is turned up too far, oscillation may result. The best operating point will be found below the point of oscillation.

NULLING.

Tune in the desired signal while the Q-Multiplier is OFF. If the interfering signal is within 3500 cycles of the desired signal, it can be nulled by the Q-Multiplier.

Turn the PEAK-OFF-NULL switch to NULL. Adjust the QX TUNING control slowly, from the far left to the far right position, until the undesired signal is nulled out. Note that there are two positions in which one of the signals is nulled. In one, the undesired signal is nulled. In the other, it is the desired signal which is removed. If the desired signal is nulled, the audio will be highly distorted. In this case, it is simple to readjust the QX TUNING for the desired nulling results.

NOTE: Do not use the MAIN TUNING and BANDSPREAD controls while adjusting the Q-Multiplier controls.

REMOTE CONTROL

The two terminals marked REMOTE at the rear of the chassis can be connected to the transmit-receive switch of a transmitter, or to the contacts of a transmit-receive relay. When you use remote control, the OFF-STBY-RCV-CAL switch should be set in the STBY position.

INSTALLING THE S-METER

An easily installed S-METER is available as an accessory to the receiver. The S-METER makes it possible to measure the relative strength of incoming signals. It is calibrated in nine "S" steps of approximately 6 db each, so that each step is double the signal strength of the preceding step. The last two calibrations read plus 20 and plus 40 db over S9.

If you have not already purchased the S-METER, save this manual. It includes instructions for assembling the S-METER. This meter is to be installed on the front panel.

SEE FIGURE 27.

DO NOT ADD THIS CIRCUIT WHILE THE RECEIVER IS PLUGGED INTO A POWER OUTLET.

☐ If you did not mount the hole cover, omit this step. Remove the receiver from the cabinet. Temporarily remove the front panel. Then remove and discard the S-meter hole cover. Replace the front panel.

☒ Prepare the S-METER for mounting as follows: (Do not lose the solder lugs, lockwashers, and two sizes of nuts packed with the meter.) Remove the shorting wire between the two terminals. Put a solder lug over each terminal, position them as shown, and fasten each with a nut.

☒ Thread 2 nuts on each of the 4 mounting screws of the meter.

☒ Insert the meter, through the front panel and into the mounting holes on the sub-panel. Fasten with four lockwashers and nuts.

☒ Solder one end of a violet wire to the plus (+) terminal.

☒ Solder one end of a white-brown wire to the other or unmarked terminal.

☒ Route the violet and white-brown wires through hole B.

An antenna input is provided for either open wire line or for coaxial cable.

The signal is fed from the antenna to the grid of the RF amplifier, V-1, the 6BZ6, through the tuned circuit of the last section (wafer E-F) of the band-switched coils and C-1A. The signal goes to the mixer (the pentode section of V-2, the 6BH8, through the tuned circuit of the band-switched (wafer C-D) coils and C-1B with the BANDSPREAD capacitor, C-2A. The first section of S-1 (wafer A-B) switches coils in the oscillator grid (the triode section of the 6BH8), which operates as a tuned grid oscillator. The oscillator is tuned by C-1C and by C-2B, the BANDSPREAD capacitor. This oscillator operates continuously even when the receiver is in standby position, and the plate of this tube is supplied with regulated voltage through V-3, the OB2. This insures maximum oscillator stability. The oscillator voltage injection takes place through a 10 μ fd capacitor on band A, through a 3.3 μ fd capacitor on band B, and through the internal capacity between the two sections of the 6BH8 on the two high bands, C and D.

The Q-Multiplier circuit is inserted at the output of the mixer. This is a tuneable null or peak circuit which either puts a sharp peak in the IF response curve, or a shiftable null which can be adjusted to provide as much as 60 db attenuation. This circuit makes it possible to tune out much of the unwanted interference and to bring in the wanted signal more clearly. This is accomplished with V-4 (the 12AX7), L-14, C-26, and the associated circuitry.

The IF amplifier section consists of the pentode sections of V-5 and V-6, both 6AZ8 tubes. These IF amplifiers are stabilized.

The detection takes place in the first of three diodes of the 6BC7, V-7. The second diode is used as a delayed AVC rectifier which can be turned off by S-3 at the front panel. A two-volt signal must be applied from the second detector before AVC action begins. The third section of the 6BC7 is used as a series noise limiter which cuts off the high noise peaks. This circuit is inserted between the second detector and the volume control by the switch, S-3, on the front panel.

The audio voltage amplifier consists of the triode section of the 6AZ8 second IF amplifier, V-6B. The output power amplifier, the pentode section of the 6AW8A (V-8), can either drive low impedance phones or an 8 Ω speaker. The triode section of the 6AW8A is used as the beat frequency oscillator (BFO). The BFO output is injected into the grid of the second IF amplifier, V-6A, through the capacity coupling available in R-32, a 10meg Ω resistor. Injecting the BFO output into the second IF reduces the power necessary to get adequate BFO action, which permits this circuit to operate with a minimum of harmonics.

The 6X4 full-wave rectifier tube, V-9, provides the DC operating voltages.

When this receiver is on "STANDBY", the cathodes of the RF amplifier and the first IF amplifier are biased to cut-off. "Break-in" operation is made possible by connecting an external keying relay to the "remote" terminals at the rear of the receiver when it is switched to "Standby". Shorting these terminals restores the receiver to operation.

This receiver is designed so the 100 kc Crystal Calibrator may be installed internally and operated from the front panel, as shown elsewhere in this manual.

The S-METER may be installed on the front panel and wired into the circuit as shown elsewhere in this manual.

RESISTANCE CHART

Control positions: OFF-STBY-RCV-CAL in OFF; QX SELECTIVITY at maximum; PEAK-OFF-NULL in PEAK; BFO-MVC-AVC-ANL in AVC; RF GAIN at maximum; A-B-BAND-C-D in A; AF GAIN at maximum.

All readings from point indicated to chassis ground except: *Readings from point indicated to B+ (holes 11 and 12 on the IF printed circuit board.)

TUBE	1	2	3	4	5	6	7	8	9
V-1 6BZ6	3M	100K*	0	.1 Ω	2.3K*	56K*	0	NS	NS
V-2 6BH8	0	27K	15K*	0	.1 Ω	150 Ω	82K	10K	2.7K
V-3 OB2	NS	0	4.5K*	NS	NS	NS	NS	NS	NS
V-4 12AX7	240K*	2.7M	1.5K	0	0	28K*	2.7M	5.6K	.1 Ω
V-5 6AZ8	2.7K*	47K*	100K*	.1 Ω	0	2.1M	0	0	0
V-6 6AZ8	2.7K*	47K*	680 Ω	.1 Ω	0	2M	2.7K	220K*	1M
V-7 6BC7	100 Ω	1M	NS	0	1.2 Ω	230K	230K	440K	0
V-8 6AW8A	open	47K	260K	0	.1 Ω	180 Ω	500K	0*	175 Ω *
V-9 6X4	185 Ω	NS	.1 Ω	0	NS	185 Ω	300 Ω *	NS	NS

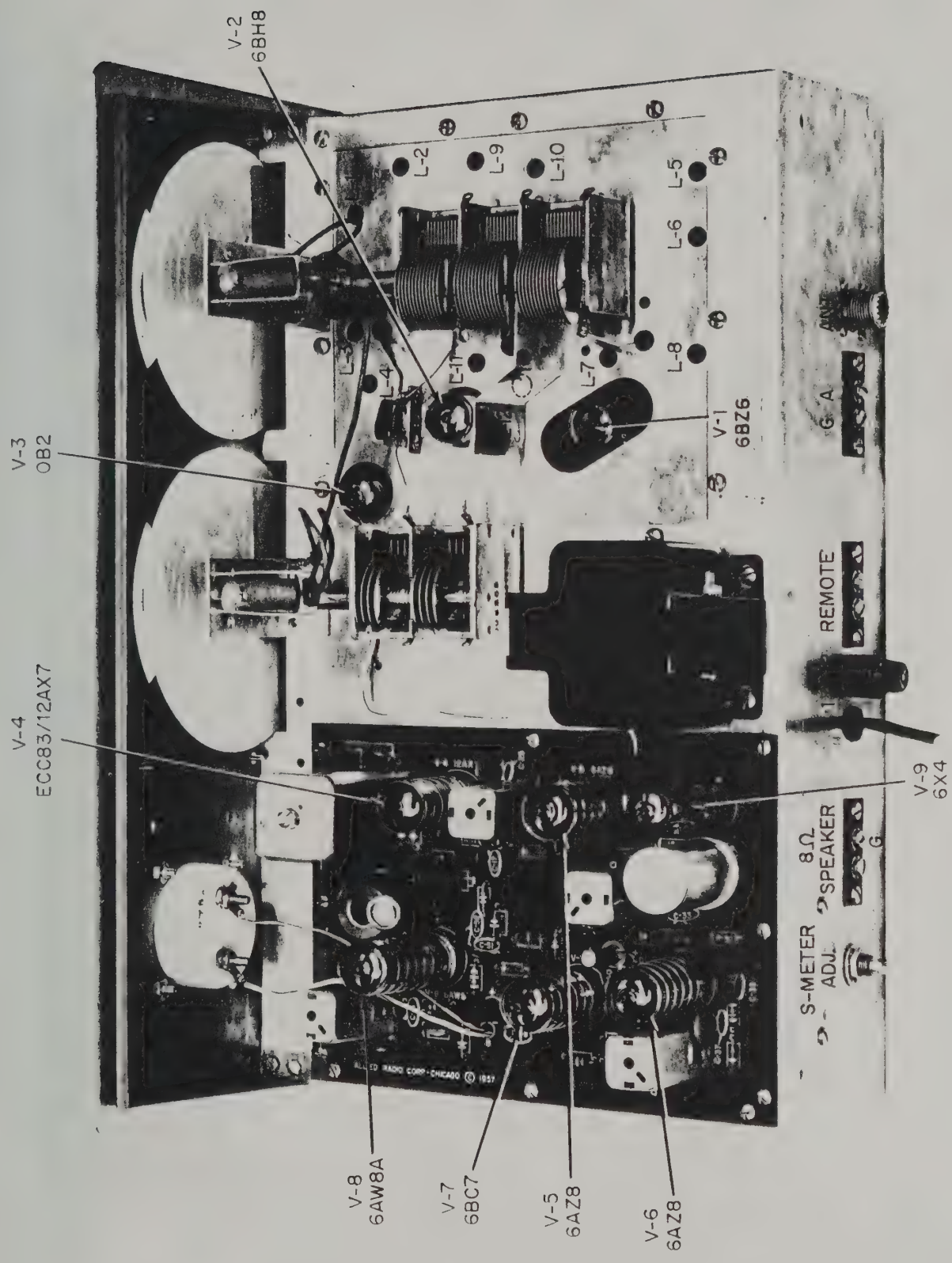
NS = not significant.

SERVICE HINTS

The proper operating voltages are found on the circuit diagram, Figure 29.
The proper resistances are found in the resistance chart on page 38.
Never measure resistances with the receiver turned on.

TROUBLE	POSSIBLE CAUSE	SERVICE PROCEDURE
Receiver dead	Defective tube(s)	Replace defective tubes.
	Tubes in wrong sockets or not seated	Visual inspection.
	Line cord not in AC outlet	
	Fuse open	Check fuse. Look for power supply shorts.
	Phone jack miswired	Check voltages and resistances. Check wiring for wrong connections.
	No B+ voltage	
	OFF-STBY-RCV-CAL switch open or miswired	
	R-1 open	
	R-2 open or miswired	
	Speaker (or headphones) defective	
Poor sensitivity on one band only	S-4 miswired	Check wafer A-B on BAND switch, and associated coils. Test 6BH8.
	Oscillator not working	
Poor sensitivity on all bands	Terminals of Bandswitch or coils poorly soldered	See page 14. Resolder terminals.
	RF GAIN control turned too low	Check control setting.
Output distorts on strong AM signals when receiver is in AVC position	Low B+ voltages	Check C-54.
	Defective tubes	Check tubes, especially 6BZ6, 6BH8, 6AZ8, 6X4.
	IF stages misaligned	Realign. See page 27.
	RF and mixer stages misaligned	Realign. See page 29.
	Improper setting of Q-Multiplier controls	See page 29.
Output distorts on strong AM signals when receiver is in AVC position	AVC line is grounded	Check S-3 wiring, C-46, C-59 and C-60. Test 6BC7.
	Distortion on strong local stations	Turn down RF GAIN.

Receiver oscillates ("motorboats")	Tube shields not seated against ground clips Bad ground on shielding of the lead from pin 9 of 6BH8 IF circuits regenerative RF and mixer circuits regenerative RF shield plate not properly soldered to C-1 QX SELECTIVITY control set too high	Reseat all shields. Check solder connections. Check C-30 and C-35. Nut loose on spade lug in hole K of RF printed circuit board. See Figure 23. Check solder joint. Readjust QX SELECTIVITY.
Hum	C-49 positioned wrong Open filter capacitor Shorted tube Short circuit which draws excessive current Bad ground to the printed circuit boards	Position correctly. C-54 defective. Test tubes. Look for wrong connections and uninsulated wires shorting. Check solder connections of yellow wire from hole 33 on IF board to ground.
Beat frequency oscillator does not function	Bad 6AW8A S-3, L-15, C-38, or C-39 open, shorted, or miswired L-15 not properly adjusted	Replace tube. Check voltages, resistance, and wiring. Readjust L-15.
Receiver High-Frequency oscillator unstable	Low B+ (OB2 not "firing") Defective 6BH8	OB2 should glow blue. Measure the voltages. Replace 6BH8 tube.
Adjustment of C-12 or C-16 doesn't affect alignment	Trimmers miswired Terminals shorted or not soldered on wafers A, B, C or D of switch S-1.	Retcheck C-12 or C-16 wiring. Check soldering of S-1 terminals. Check for shorts on foil side of S-1.
Q-Multiplier not operating	Defective 12AX7	Replace 12AX7 tube.
Does not peak	L-14 improperly adjusted	Readjust L-14.
Does not null	R-25 improperly adjusted	Readjust R-25.



EQUIPMENT USED FOR SPECIFICATION MEASUREMENTS

- Simpson Model 390 Wattmeter Hewlett-Packard Model 400D AC VTVM
- Simpson Model 260 VOM Tektronix Model 531 Oscilloscope
- Triplet Model 630A VOM Measurements Corp. Model 65B RF Generator
- Frequency Standard BC 221

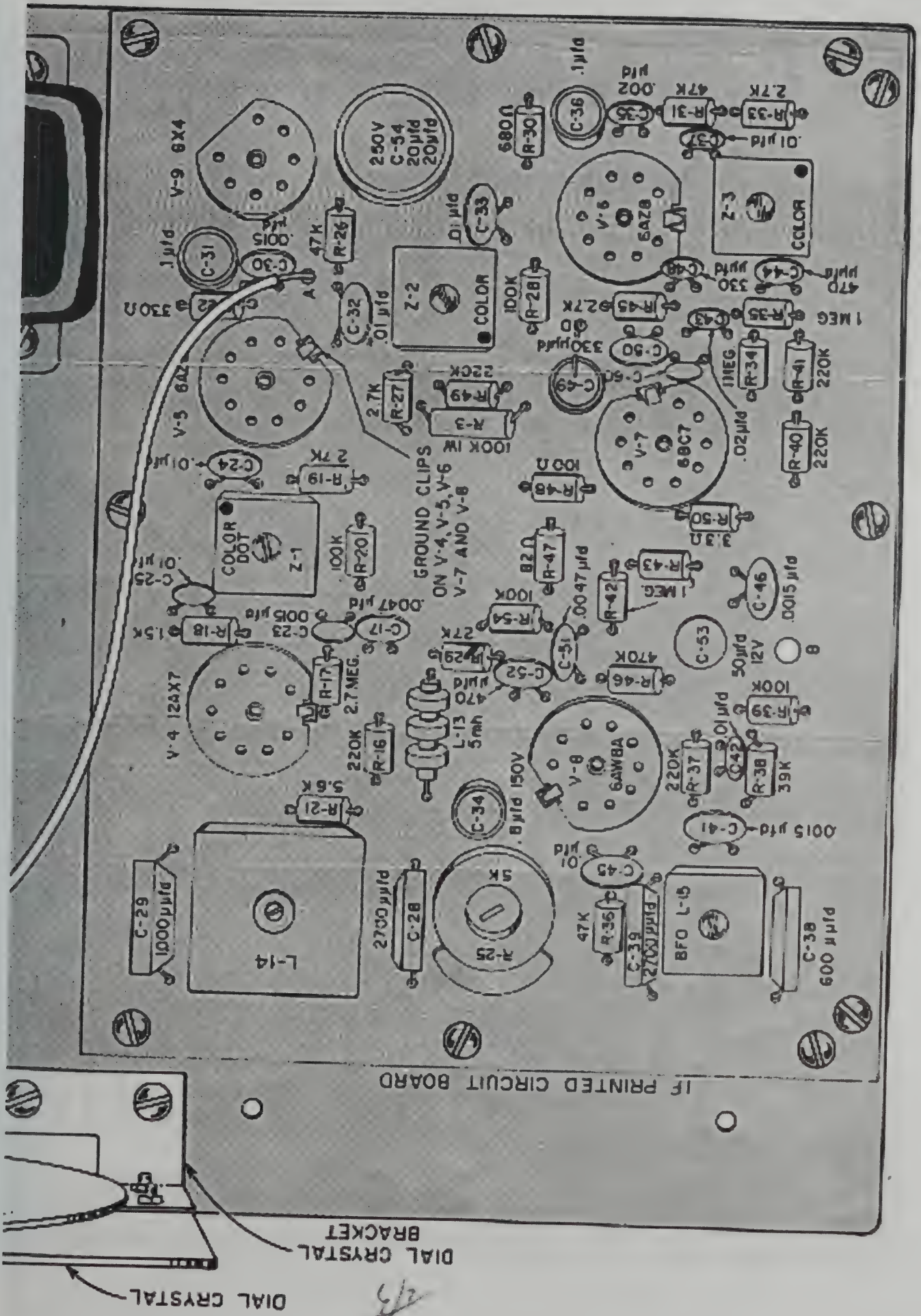


FIGURE 20. PAR

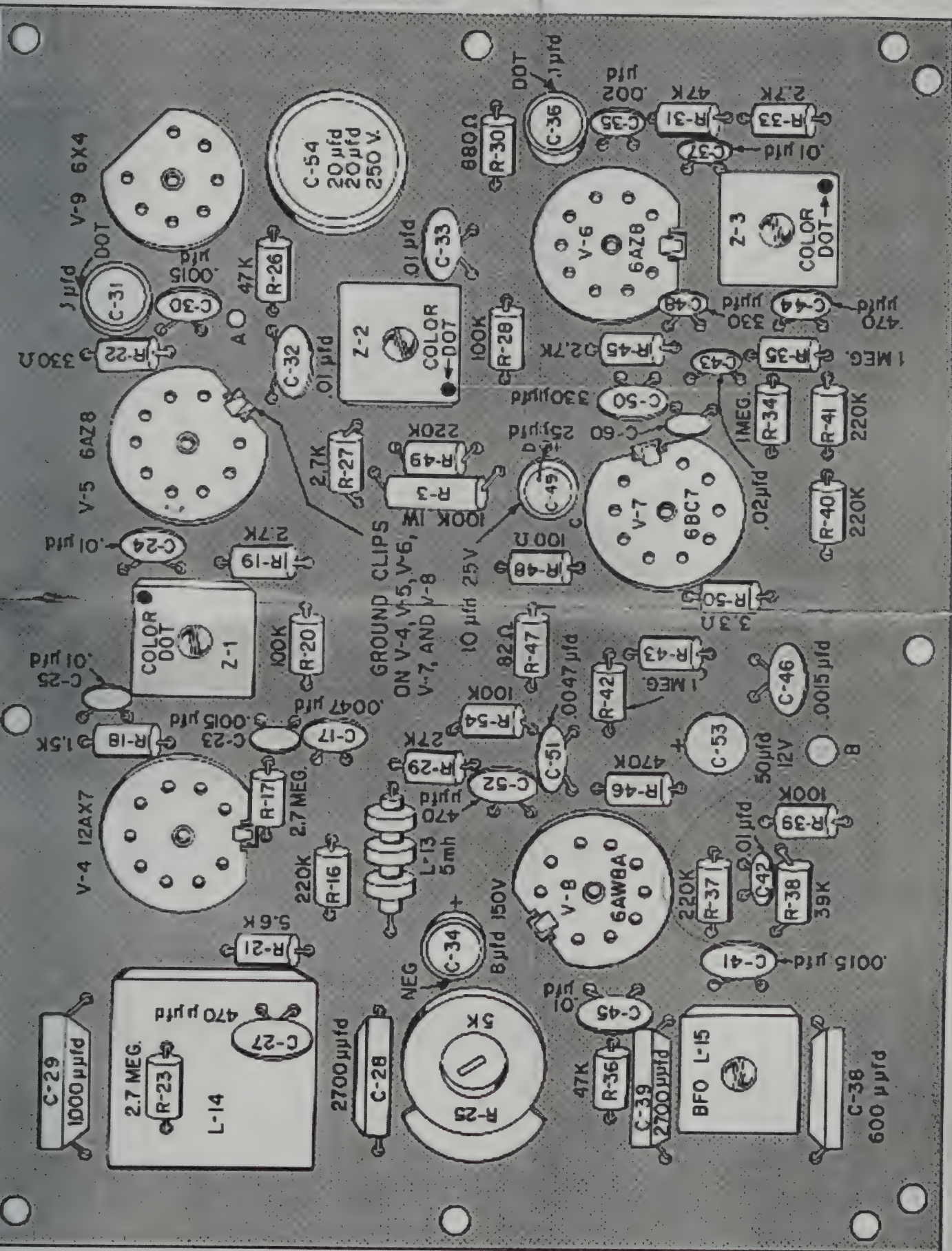
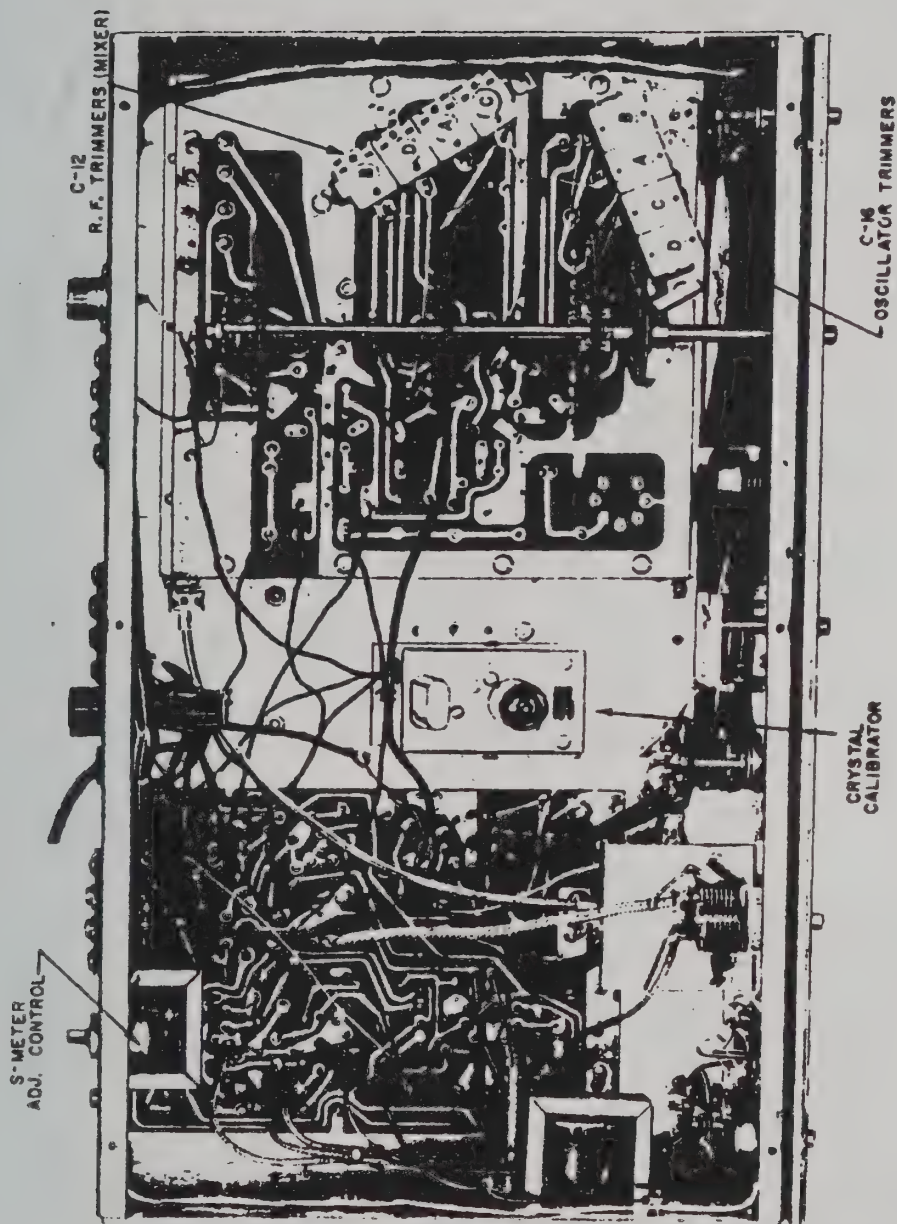


FIGURE 1. PARTS MOUNTING ON THE IF PRINTED CIRCUIT BOARD



PARTS LIST

CAPACITORS

Symbol No.	Description	Part No.	Symbol No.	Description	Part No.
C-1	Main tuning	282023	C-38	Mica, 600 μ fd	286018
C-2	Bandspread	286058	C-39	Mica, 2700 μ fd	286017
C-3	Antenna control, 80 μ fd, variable	281016	C-40	BFO control, 50 μ fd, variable	281011
C-4	Molded tubular, 1 μ fd —200V	286029	C-41	Ceramic disc, .0015 μ fd	278137
C-5	Ceramic disc, .01 μ fd	276015	C-42	Ceramic disc, .02 μ fd	276015
C-6	Mica, 100 μ fd	286023	C-43	Ceramic disc, .02 μ fd	276015
C-7	Ceramic disc, .01 μ fd	276015	C-44	Ceramic disc, .01 μ fd	276015
C-8	Ceramic disc, .01 μ fd	276015	C-45	Ceramic disc, .01 μ fd	276015
C-9	Ceramic disc, .01 μ fd	276015	C-46	Ceramic disc, .0015 μ fd	276015
C-10	Mica, 200 μ fd, 3%	285001	C-47	Ceramic disc, .0047 μ fd	276015
C-11	Ceramic disc, .01 μ fd	276015	C-48	Ceramic disc, 330 μ fd	276015
C-12	3-30 μ fd compression trimmers, four on bracket	285002	C-49	Electrolytic tubular, 10 μ fd—25V	278137
C-13	Mica, 600 μ fd	285002	C-50	Electrolytic tubular, 10 μ fd—25V	278137
C-14	Mica, 2000 μ fd	286019	C-51	Ceramic disc, 330 μ fd	278137
C-15	Mica, 5000 μ fd	286020	C-52	Ceramic disc, .0047 μ fd	276477
C-16	3-30 μ fd compression trimmers, four on bracket	285002	C-53	Electrolytic tubular, stand-up type, 50 μ fd	276478
C-17	Ceramic disc, .0047 μ fd	285002	C-54	Electrolytic, 20/20 μ fd—250V	289002
		276477	C-55	Ceramic disc, .0047 μ fd	276477
			C-56	Ceramic disc, .0047 μ fd	276477
			C-57	Mica, 100 μ fd	286023

Symbol No.	Description	Part No.	Symbol No.	Description	Part No.	Quantity	Part No.
C-58	Mica, 100 μ fd, odd shaped	296022	R-46	470K Ω	301474	1	463476
C-59	Ceramic disc, .01 μ fd	276015	R-47	820	301820	1	463490
C-60	Ceramic disc, .25 μ fd	276015	R-48	1000	301820	1	830001
C-61	Ceramic disc, .01 μ fd	276015	R-49	220K Ω	301101	2	330200
C-62	Ceramic disc, .01 μ fd	276015	R-50	330	301224	1	492200
C-63	Mica, 33 μ fd	266339	R-51	330	301338	1	765054
C-64	Tubular ceramic, 50 μ fd $\pm$ 2%	See L-8	R-52	1 me Ω	301330	10	765054
			R-53	10K Ω	301105	2	765052
			R-54	100K Ω	301103	1	750388
					301104	1	470109
L-1	Oscillator, Band A	122203	SWITCHES				470114
L-2	Oscillator, Band B	122204					860012
L-3	Oscillator, Band C	122205					470107
L-4	Oscillator, Band D	122206					470117
L-5	RF, Band A	122207					470121
L-6	RF, Band B	122208	S-1	A-B-BAND-C-D	435004	1	510002
L-7	RF, Band C	122209	S-2	PEAK-OFF-NULL	437066	1	510004
L-8	RF, Band D, with C-64 capacitor	122210	S-3	BFO-MVC-AVC-ANL	432130	1	510002
L-9	Mixer, Band A	122210	S-4	OFF-STBY-RCV-CAL	432131	1	510003
L-10	Mixer, Band B	162005	TERMINAL STRIPS				501672
L-11	Mixer, Band C	162006					501674
L-12	Mixer, Band D	162007					501695
L-13	RF choke, 5 millihenries	161001					501194
L-14	Q-Multiplier	162010					463402
L-15	BFO	162009					470469
L-16	Filter choke, 5.5 henries	140003					470469
							470469
							470469
							470469
							470469

HARDWARE

Lockwasher, #4	15	562200
Lockwasher, #6	35	562300
Lockwasher, #8	3	562400
Lockwasher, 3/8"	3	562700
Lockwasher, 1/2"	2	562800
Nut, 3-48	18	570110
Nut, 4-36	23	570230
Nut, 6-32	49	570340
Nut, 1/8-32	14	570840
Nut, 1/2-20	2	570960
Screw, 3-48x1/4"	6	560112
Screw, 3-48x3/8"	12	563114
Screw, 4-36x3/8"	31	560234
Screw, 6-32x1/4"	3	560342
Screw, 6-32x5/16"	64	560343
Screw, 6-32x3/8"	6	560344
Screw, 6-32x5/16"	4	563343
Screw, 6-32x7/16"	3	560345
Screw, 8-32x1/4"	2	563442
Screw, self-tapping	2	562393
Self-tapping screw, 6-32x1/4"	4	563342
Self-tapping screw, 8-32x1/4"	4	569001
Solder lug, #6	4	553005
Solder lug, 3/8"	1	553001
Solder lug, 6-32	1	568344
Washer, flat, #6 hole	6	580300
Washer, flat, 25/64"	7	580702
Washer, C	4	585002

WIRE, SOLDER, AND SPAGHETTI!

Braid shielding 2 1/2"	1	804005
Cable, 9-conductor, 30"	1	803021
Cord, Line	1	802001
	1	930005
Solder, 20 ft.	1	812009
Spaghettti, #20, 15"	2	801002
Wire, 2", red	4	801003
Wire, 3", orange	9	801004
Wire, 4", yellow	4	801005
Wire, 5", green	2	801006
Wire, 6", blue	3	801007
Wire, 7", violet	1	801012
Wire, 12", white/red	1	801016
Wire, 16", white/blue	1	804086
Wire, red stranded, #22, 9"	1	803025
Wire, shielded, insulated 16"	1	803029
Wire, shielded, 41"	1	906038
Wire, bare, #20, 38"	1	

BULBS		HARDWARE	
Dial Light #47	640002	Lockwasher, #4	15
Dial Light #47	640002		582200

TRANSFORMERS

Z-1	Intermediate frequency	122211	Nut, 3-48	18	582800
Z-2	Intermediate frequency	122211	Nut, 4-36	23	570110
Z-3	Intermediate frequency	122211	Nut, 6-32	49	570230
T-1	Output	122211	Nut, 1/4-32	14	570340
T-2	Power	101311	Nut, 1/2-20	2	570840
			Screw, 2-18x1/2"	2	570960
			Lock washer, 1/2	2	

FUSE

Part Number	Description	Quantity	Unit Price	Total Price
491001	Screw, 6-32x3/8"	1	1.00	1.00
560344	Screw, 6-32x5/16" Flat-head	1	1.00	1.00

TUBES

V-1	6BZ6	610050	Setscrew, 3-32 1/4", headless	4	38342
V-2	6BH8	611023	Solder lug, #6	1	369001
V-3	OB2	610051	Solder lug, 1/8"	1	353005
V-4	12AX7/ECC83	611012	Spade lug, 6-32	1	353001
V-5	6AZ8	611024	Washer, flat, #6 hole	6	368344
V-6	6AZ8	611025	Washer, flat, .25/64"	7	380300
V-7	6BC7	611026	Washer, C	4	380702
V-8	6AW8A	611026		1	385002
V-9	6X4	610023		1	

MISCELLANEOUS

Description	Quantity	Part No.	Cable, Line	9-conductor, ² 30"
Alignment tool, I.F.	1	957000—	Solder, 20 ft.,	804000
Alignment tool, R.F.	1	957003—	Spaghetti, ≈20, 15"	303021
Board, printed circuit, I.F.	1	820019—	Wire, 2", red	920001
Board, printed circuit, R.F.	1	820020—	Wire, 3", orange	930005
Bushing, threaded, 3/8"	1	470075—	Wire, 4", yellow	812009
Cabinet	2	470075—	Wire, 5", green	801002
Dollar, Threaded	1	702056—	Wire, 6", blue	801004
chassis	2	470253—	Wire, 7", violet	801005
dial crystal	1	463482—	Wire, 12", white/red	801007
dial, bandspread tuning	1	370063—	Wire, 16", white/blue	801012
dial, main tuning	1	370046—	Wire, red stranded, ≈22, 9"	801016
Drive bracket, vernier	1	370045—	Wire, shielded, insulated 16"	804086
elt pad	2	470113—	Wire, shielded, 41"	303025
elt pad	2	850152—	Wire, bare, ≈20, 38"	803029
elt, rubber	4	831001—		906038

J-1	Coaxial antenna jack	502222
J-2	Phone jack	502228

RESISTORS

All resistors $\frac{1}{2}W$, 10%, unless specified otherwise

R-1	680	RF GAIN control, 5K Ω	301680
R-2	100K Ω , 1 watt		390115
R-3	330		304104
R-4	27K Ω		301330
R-5	4700 Ω , 2 watt		301273
R-6	10K Ω , 1 watt		307472
R-7	47K Ω		304103
R-8	680		301473
R-9	6800 Ω		301680
R-10	2200 Ω		301682
R-11	337		301222
R-12	82K Ω		301330
R-13	1507		301823
R-14	820K Ω		301151
R-15	220K Ω		301824
R-16	2.7 meg Ω		301224
R-17	1500 Ω		301215
R-18	2700 Ω		301152
R-19	100K Ω		301272
R-20	5600 Ω		301104
R-21	3507		301562
R-22	2.7 meg Ω		301331
R-23	QX SELECTIVITY control, 10K Ω		392164
R-24	QX NULL control, 5K Ω		390133
R-25	47K Ω		301473
R-26	2700 Ω		301272
R-27	100K Ω		301104
R-28	27K Ω		301273
R-29	6800		301681
R-30	47K Ω		301473
R-31	10 meg Ω		301106
R-32	2700 Ω		301272
R-33	1 meg Ω		301105
R-34	1 meg Ω		301105
R-35	47K Ω		301473
R-36	220K Ω		301224
R-37	39K Ω		301393
R-38	100K Ω		301104
R-39	220K Ω		301224
R-40	220K Ω		301224
R-41	1 meg Ω		301105
R-42	1 meg Ω		301105
R-43	1 meg Ω		301105
R-44	AF GAIN control, 1 meg Ω		390009
R-45	2700 Ω		301272

CONNECTORS

J-1	Coaxial antenna jack	502222
J-2	Phone jack	502228

Quantity	Part No.
1	463476
1	463490
3	830001
1	830200
1	92200
10	765054
2	765052
1	750388
1	470109
1	470153
2	470470
2	470114
1	860012
1	470107
1	470117
1	470121
1	510002
4	510004
2	510003
2	501672
1	501674
1	501695
1	501194
2	463402
2	470469
1	470469

HARDWARE

15	582200
65	582300
3	582400
8	582700
2	582800
18	570110
23	570230
49	570340
14	570840
2	570960
6	560112
12	563114
31	560234
5	560342
64	560343
6	560344
2	562343
2	560245
3	563442
4	562393
2	563342
4	569001
4	553005
1	553001
4	568344
6	580300
7	580702
4	585002

SOLDER, AND SPAGHETTI

1	804005
1	803021
1	802001
1	930005
1	812009
2	801002
4	801003
9	801004
3	801005
2	801006
3	801007
1	801012
1	801016
1	804086
1	803025
1	803029
1	806038

S-METER PARTS LIST

Description	Part No.
Control, 680Ω (S-Meter adjust)	390135
Lockwasher, 3/8" control	382700
Nut, 6-32	570340
Nut, 3/8" control	570840
Resistor, 820Ω, 1/2 watt	301821
S-Meter, with hardware	652205
Solder, 6"	930002
Wire, 2" red	801002
Wire, 3" orange	801003
Wire, 7" violet	801007
Wire, 11" white-brown	801011

TOOLS NEEDED FOR CONSTRUCTION

Stock No.	Description	Price*
46 N 852	Soldering iron, pencil type	\$5.26
50 N 132	6" Long-nose pliers	1.54
50 N 133	5" Diagonal cutters	1.24
45 N 796	6" Screwdriver	.72
43 N 831	6" Set-screw screwdriver	.27

ACCESSORIES

83 Y 423	S-Meter Kit	\$12.95
83 Y 256	Crystal Calibrator Kit	10.95

*Subject to change

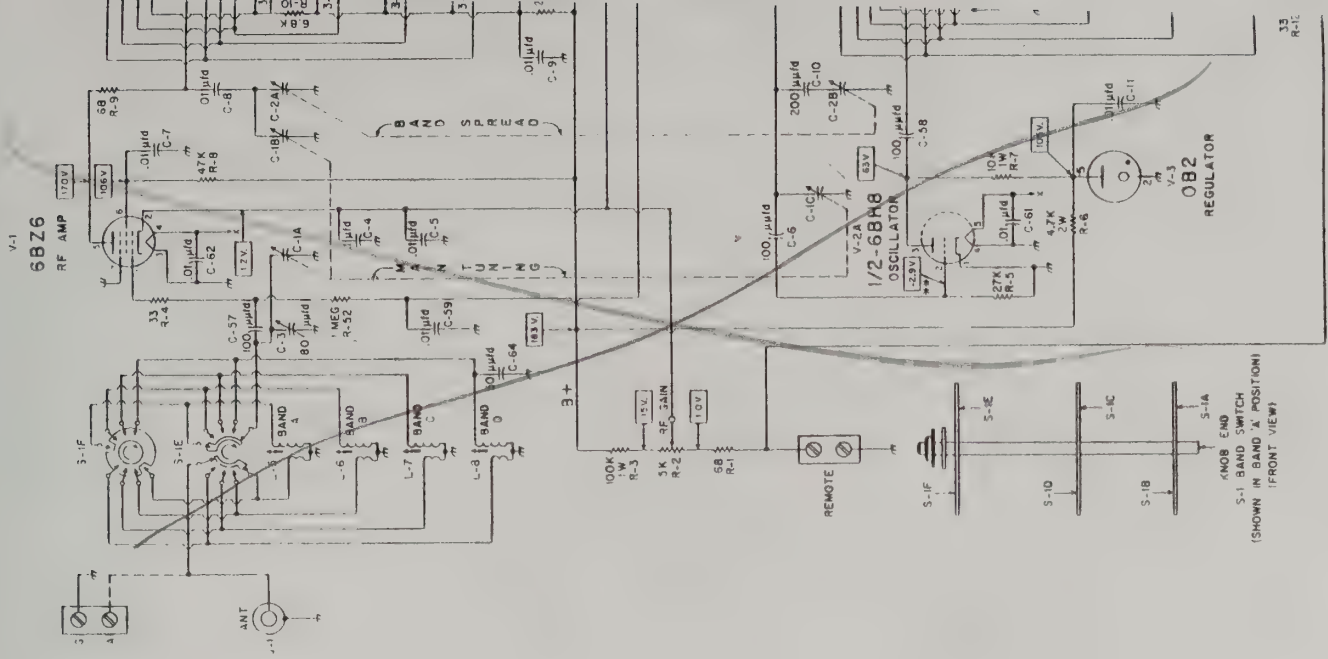
VOLTAGE MEASUREMENTS

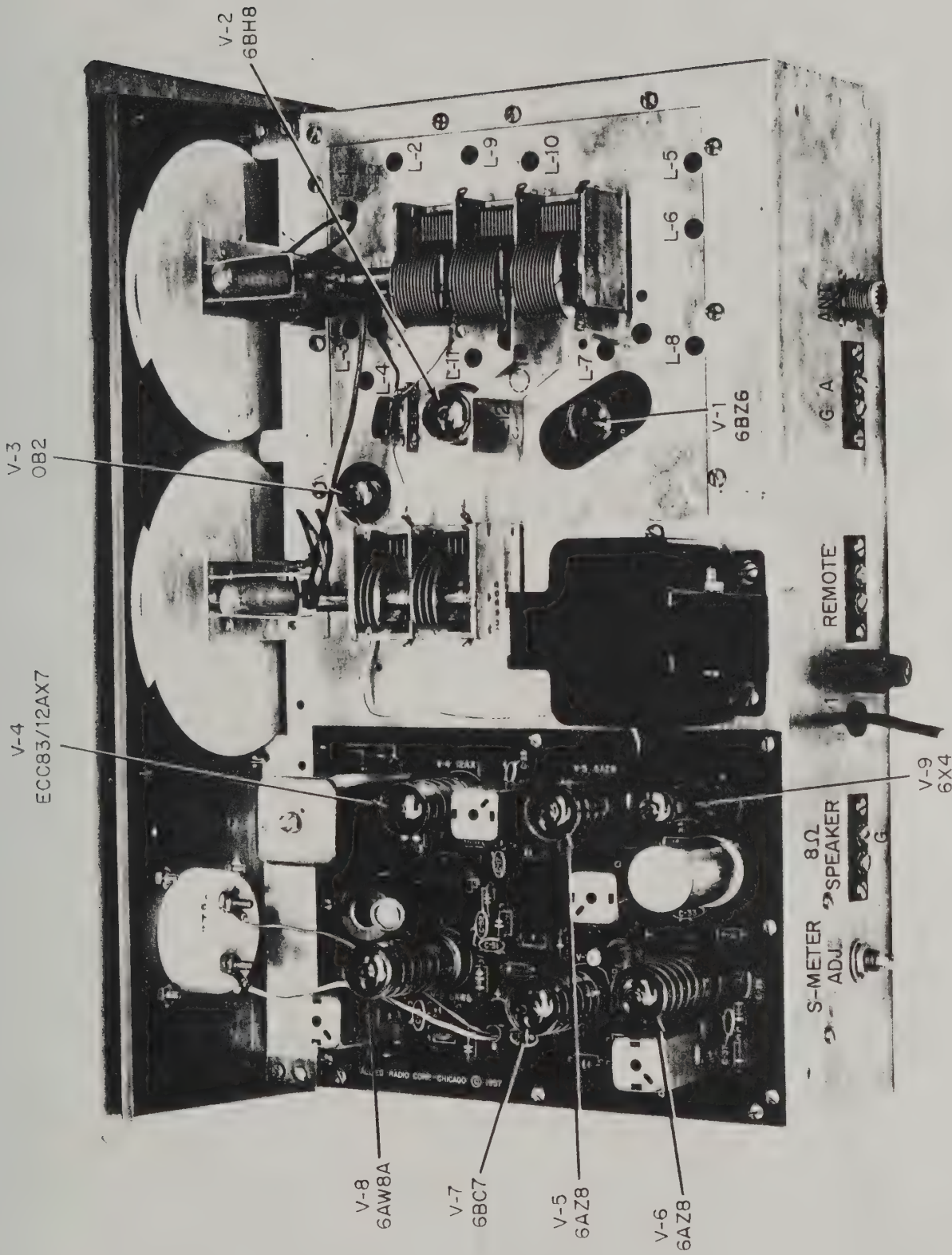
ALL VOLTAGE MEASUREMENTS ARE TAKEN FROM POINTS INDICATED TO GROUND WITH A VTVM. NO SIGNAL INPUT.
BAND SWITCH S-1 ON BAND 'A' POSITION.
S-2 IN OFF POSITION.
RF GAIN SET AT MAXIMUM.
AF GAIN SET AT MINIMUM.
S-3 IN MVC POSITION.
* VOLTAGES WITH S-3 IN BFO POSITION.
** VARIES WITH SETTING OF C-1

NOTES

RESISTORS INDICATED IN OHMS
K=1000 OHMS
MEG=1,000,000 OHMS

TUNING RANGES	
BAND	FREQUENCY
A	.54 - 1.65 MC
B	1.6 - 4.6 MC
C	4.4 - 12.4 MC
D	12 - 30 MC





EQUIPMENT USED FOR SPECIFICATION MEASUREMENTS

Simpson Model 390 Wattmeter Hewlett-Packard Model 400D AC VTVM

Simpson Model 260 VOM Tektronix Model 531 Oscilloscope

Triplett Model 630A VOM Measurements Corp. Model 65B RF Generator

Frequency Standard BC 221

S-METER PARTS LIST

Description	Part No.
Control, 800Ω (S-Meter adjust)	390135
Lockwasher, 3/8" control	582700
Nut, 6-32	570340
Nut, 3/8" control	570840
Resistor, 820Ω, 1/2 watt	301821
S-Meter, with hardware	852205
Solder, 6" red	930002
Wire, 2" orange	801002
Wire, 7" violet	801003
Wire, 11" white-brown	801007
	801011

TOOLS NEEDED FOR CONSTRUCTION

Stock No.	Description	Price*
46 N 852	Soldering iron, pencil type	\$5.26
50 N 132	6" Long-nose pliers	1.54
50 N 133	5" Diagonal cutters	1.34
45 N 796	6" Screwdriver	.72
43 N 831	6" Set-screw screwdriver	.27

ACCESSORIES

83 Y 423	S-Meter Kit	\$12.95
83 Y 256	Crystal Calibrator Kit	10.95

*Subject to change

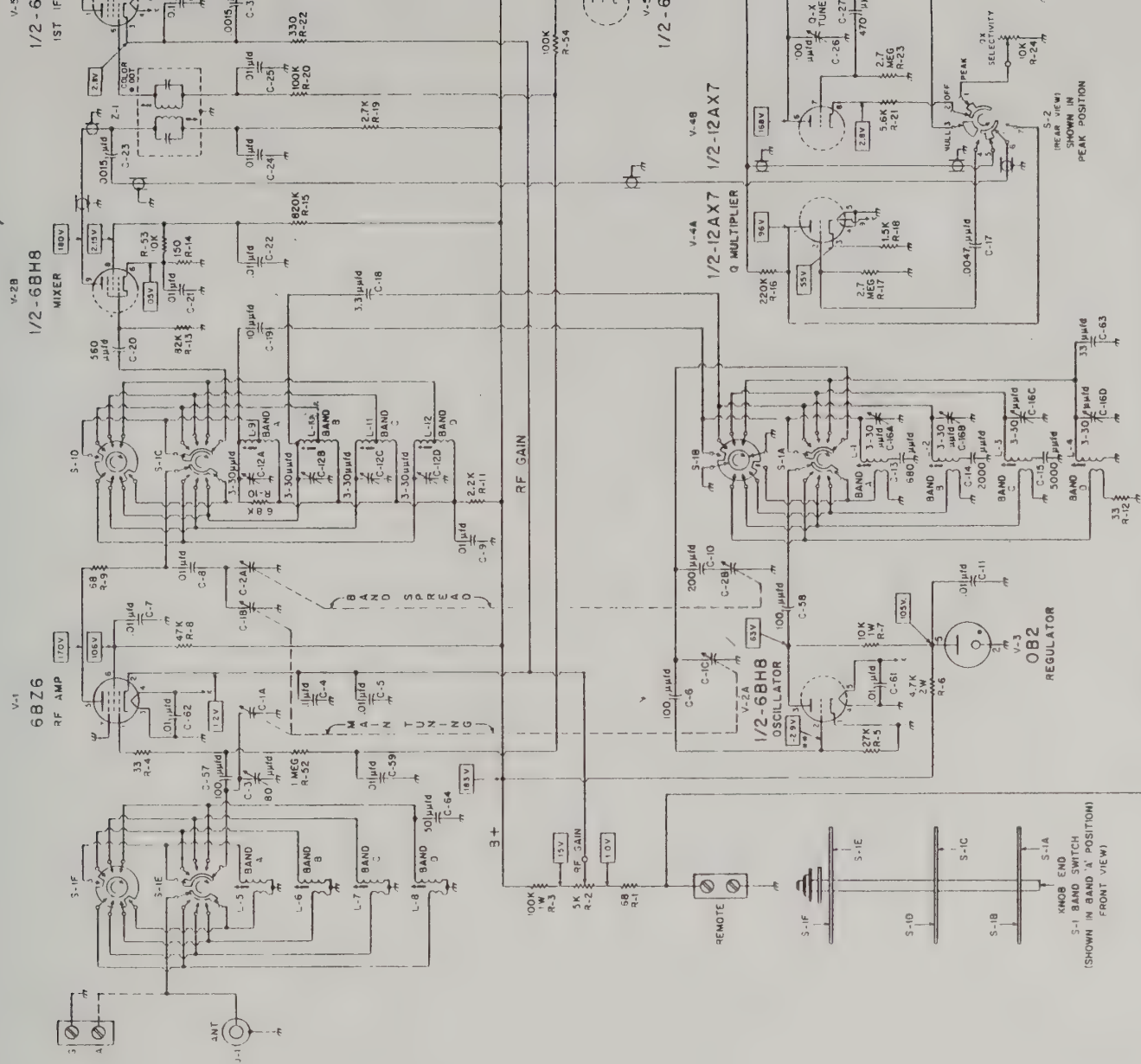
VOLTAGE MEASUREMENTS

ALL VOLTAGE MEASUREMENTS ARE TAKEN FROM POINTS INDICATED TO GROUND WITH A VTVM, NO SIGNAL INPUT.
 BAND SWITCH S-1 ON BAND 'A' POSITION.
 BFO POSITION.
 S-2 IN OFF POSITION.
 ** VARIES WITH SETTING OF C-1

NOTES

RESISTORS INDICATED IN OHMS
 K = 1,000 OHMS
 MEG = 1,000,000 OHMS

TUNING RANGES	FREQUENCY
BAND A	54 - 1.65 MC
B	1.6 - 4.6 MC
C	4.4 - 12.4 MC
D	12 - 30 MC



S-METER PARTS LIST

Description	Part No.
Control, 6800 (S-Meter adjust)	390135
Lockwasher, 3/8" control	582700
Nut, 6-32	570340
Nut, 3/8" control	570840
Resistor, 8200, 1/2 watt	301821
S-Meter, with hardware	652205
Solder, 6"	930002
Wire, 2" red	801002
Wire, 3" orange	801003
Wire, 7" violet	801007
Wire, 11" white-brown	801011

TOOLS NEEDED FOR CONSTRUCTION

Stock No.	Description	Price*
46 N 852	Soldering iron, pencil type	\$5.26
50 N 132	6" Long-nose pliers	1.54
50 N 133	5" Diagonal cutters	1.34
45 N 796	6" Screwdriver	.72
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ACCESSORIES

83 Y 423	S-Meter Kit	\$12.95
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*Subject to change

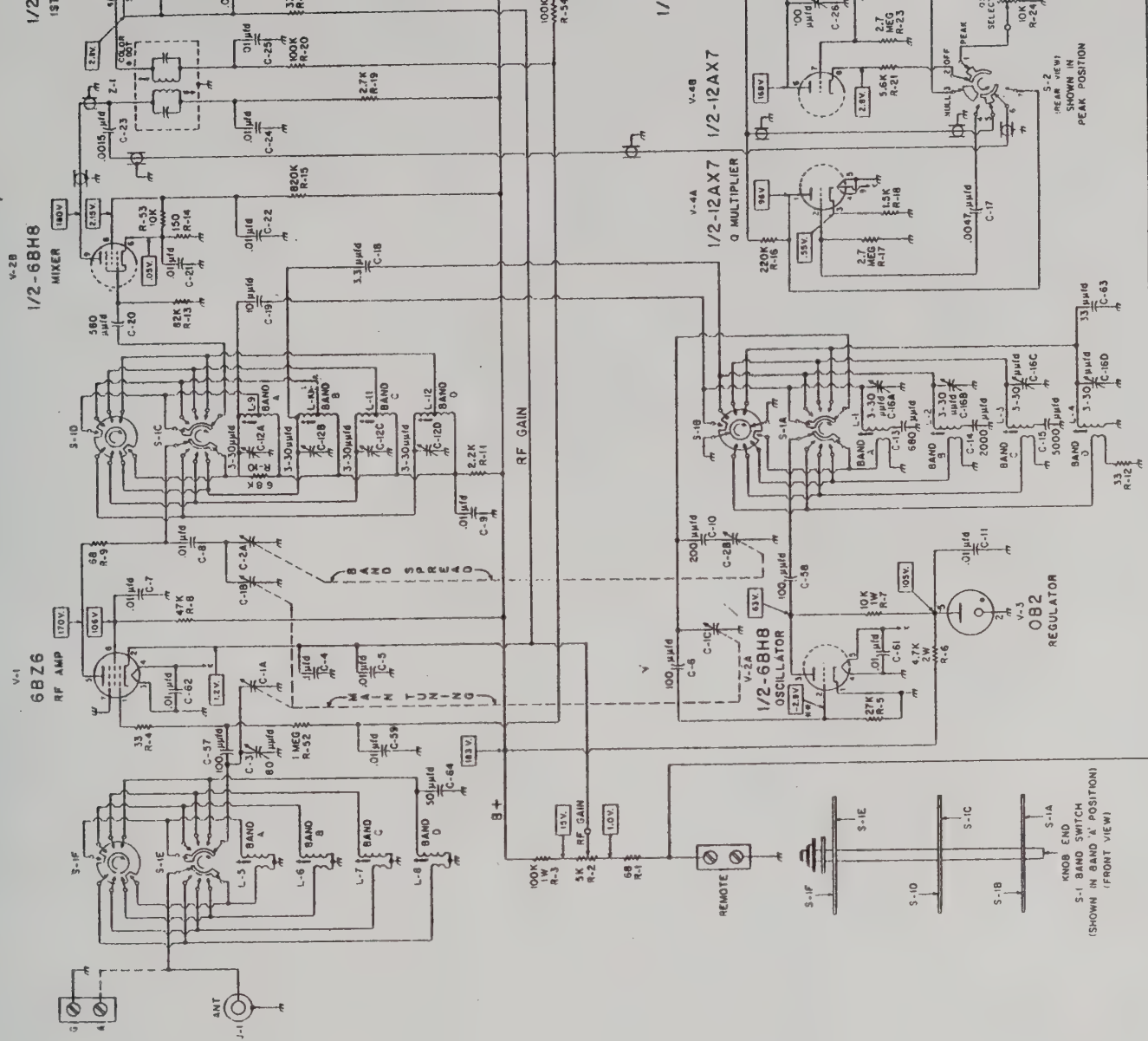
VOLTAGE MEASUREMENTS

ALL VOLTAGE MEASUREMENTS ARE TAKEN FROM POINTS INDICATED TO GROUND WITH A VTVM. NO SIGNAL INPUT.
BAND SWITCH S-1 ON BAND 'A' POSITION.
S-2 IN OFF POSITION.
* VOLTAGES WITH S-3 IN BFO POSITION.
** VARIES WITH SETTING OF C-1

NOTES

RESISTORS INDICATED IN OHMS
K=1,000 OHMS
MEG=1,000,000 OHMS

TUNING RANGES	
BAND	FREQUENCY
A	54 - 1.65 MC
B	1.6 - 4.6 MC
C	4.4 - 12.4 MC
D	12 - 30 MC



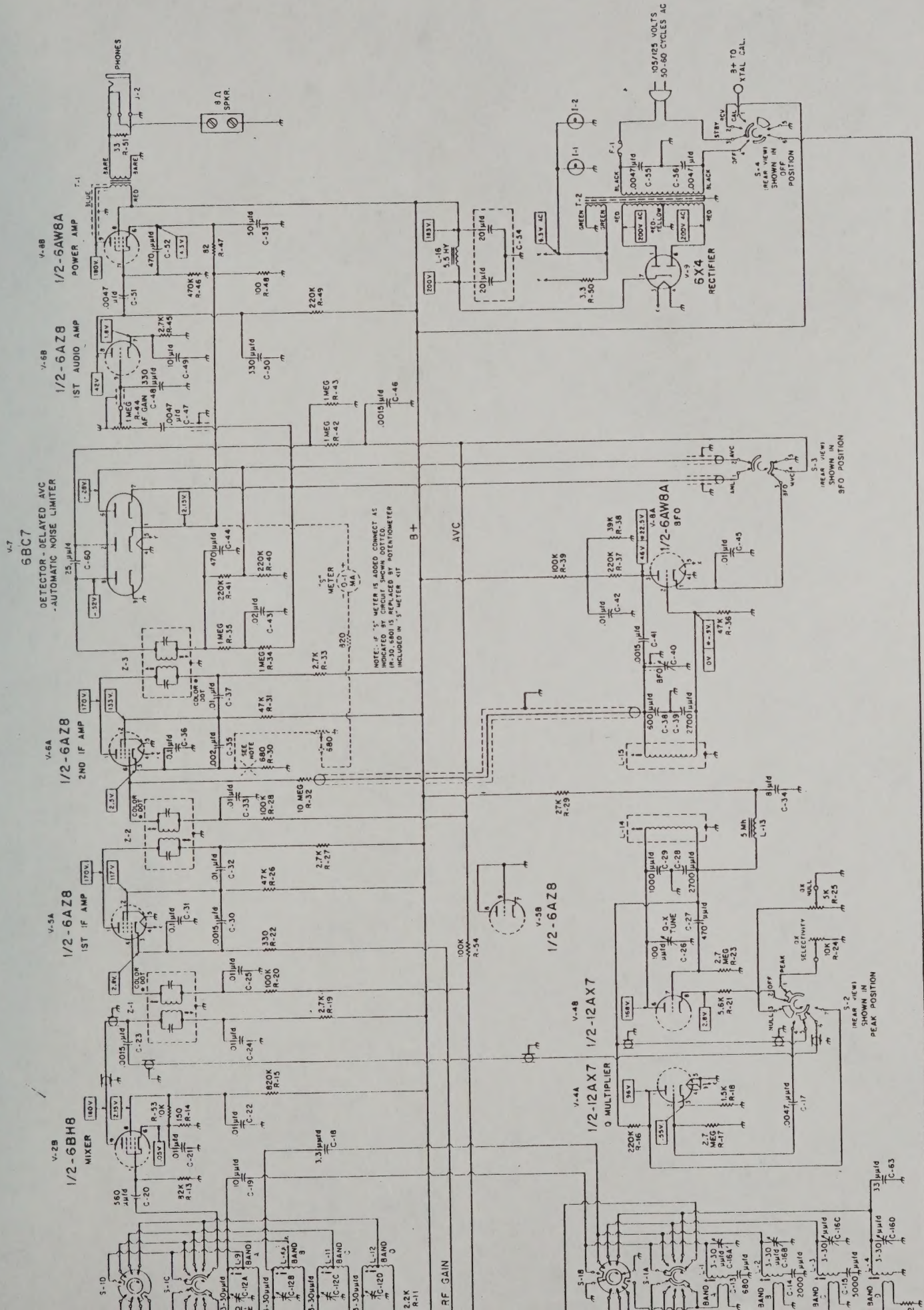


FIGURE 29 SCHEMATIC DIAGRAM

